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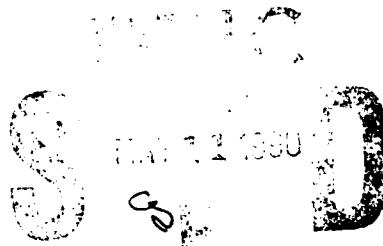
ManTech International Corporation  
6906 West Highway 98  
Panama City, Florida 32407

For

Carol Denton  
Naval Training Equipment Center  
Department of the Navy  
Orlando, Florida 32813

AIR CUSHION VEHICLE  
OPERATOR TRAINING SYSTEM  
(ACVOTS)  
TASK LISTING FOR LCAC OPERATOR

September 1982



Naval Training Equipment Center  
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AIR CUSHION VEHICLE OPERATOR TRAINING SYSTEM  
(ACVOTS)  
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1.0 VOLUME I.

This volume contains sections describing the procedures and sources used during the development and validation of the task listing.

1.1 Introduction.

The Air Cushion Vehicle Operator Training System (ACVOTS) program is planned to identify and fully define, test, evaluate and document Air Cushion Vehicle (ACV) operator training devices and systems.

Two advanced development ACVs, designated JEFF(A) and JEFF(B), are currently being tested under the Navy's Amphibious Assault Landing Craft (AALC) Research, Development, Test and Evaluation (RDT&E) program. These craft were designed and built to develop the technology and assess the feasibility and military utility of employing ACVs in amphibious assault. The follow-on design and procurement of the production craft are being accomplished under the Landing Craft, Air Cushion (LCAC) acquisition program. The LCAC craft are intended to be operated by an all enlisted crew. Follow-on Navy-run training for the LCAC is projected to begin in 1986. (SAC) T

This Task Listing for the JEFF(B) Operator, conducted under the direction of the David Taylor Naval Ship Research and Development Center (DTNSRDC) Code 118 with analysis management provided by the Naval Training Equipment Center (NAVTRAEEQUIPCEN) Code N-252, provides the results of analysis performed under the ACVOTS program. The JEFF(B) has an overall arrangement very similar to that of the LCAC design, and it is expected that craft performance, handling qualities and controls will also be similar to those of the LCAC.

1.2 Purpose.

The purpose of this report is to identify operator behavior for the JEFF(B). This Task Listings Report is based on requirements specified in Sections 3.4, 3.5, 3.7, 3.8 and 3.9 of Specification MIL-T-29053A(TD), Training Requirements for Aviation Weapon Systems. The task listing will form the basis for a task hierarchy from which behavioral objectives and job performance measures will evolve, according to the Instructional Systems Development (ISD) concept.

1.3 Task Listing Development and Validation Procedures.

The process used in the development of the operator task listing is illustrated in Figure 1. The mission and mission phases upon which the task listing is based was derived from "National Tactical Operational Scenarios for LCAC C N System Design," published under the direction of the Naval Sea Systems Command. To determine the mission phases, a thorough review was performed of the Operator's Manual, AALC JEFF(B), published by Bell Aerospace Textron. In addition, personal interviews were conducted with the training officer of the DTNSRDC Experimental Trials Unit and two civilian operators (SMEs) with five years' experience with the JEFF craft.

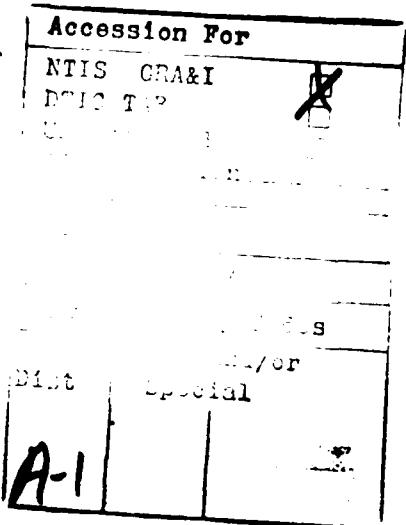
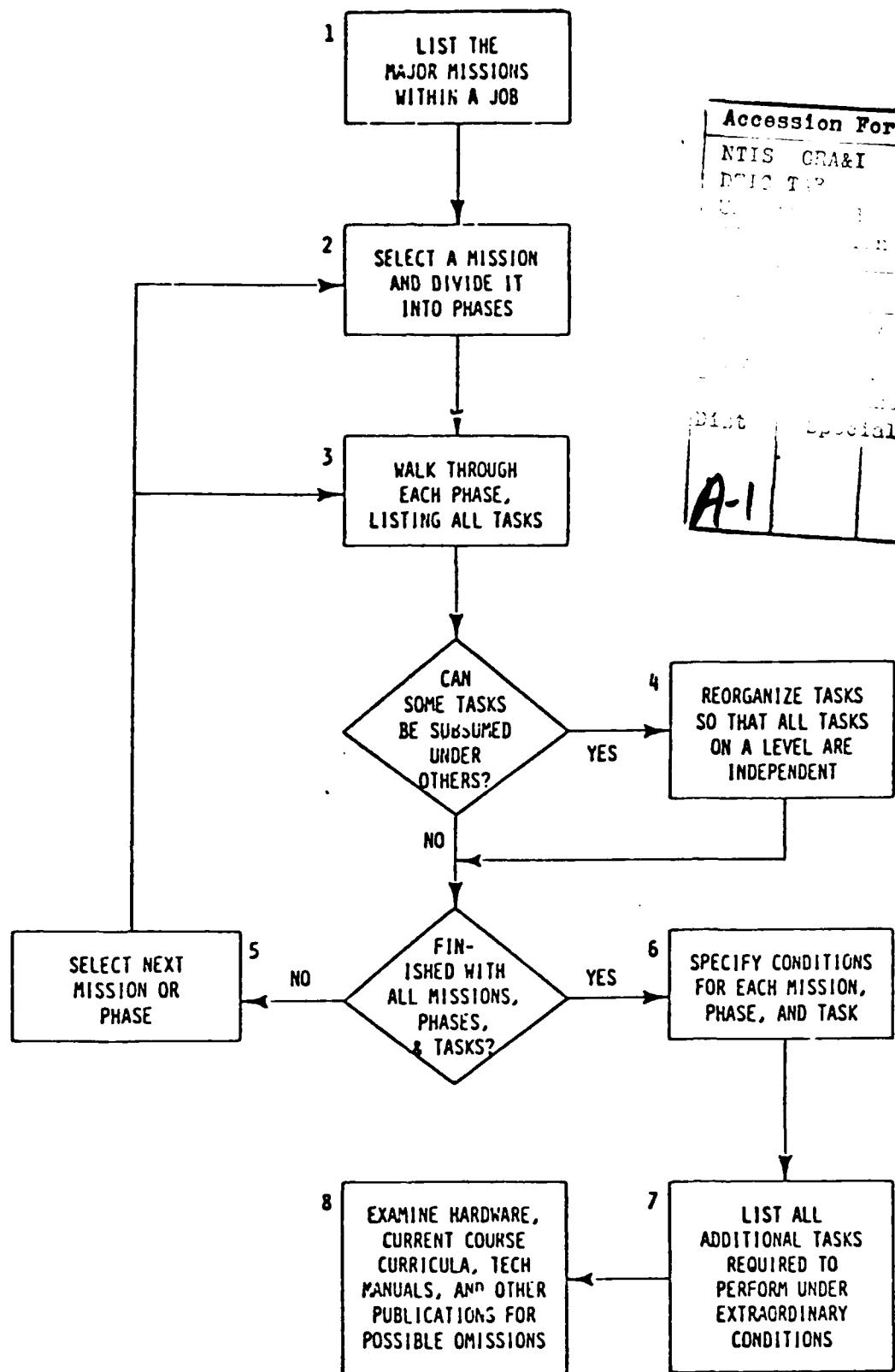


Figure 1. Operator Task Listing Process

STATEMENT "A" per James Lau  
 NTSC/Code 122, 12350 Research Parkway,  
 Orlando, FL 32826-3224

The conditions for each mission phase and task were derived from conditions reported in the "National Tactical Operating Scenarios," special procedures described in the craft manufacturer's operator handbook, and the national scenarios, because the terrain bordering the Gulf of Mexico is not a challenging environment.

#### 1.4 Task Listing Organization and Format.

The operator task listing is a comprehensive set of task statements exhaustively defining all types of mission phases and job tasks for the position of craft operator. The task listing includes task statements reflecting normal, abnormal and emergency operator activities. Each task statement is presented in the form of a behavioral objective with the action specified, along with the conditions of performance.

## 2. VOLUME II.

This volume contains the task listing for the JEFF(B) operator. The mission was divided into phases as indicated in the flowchart in Figure 2. Each phase was subdivided into major tasks and subtasks that together describe the entire mission phase.

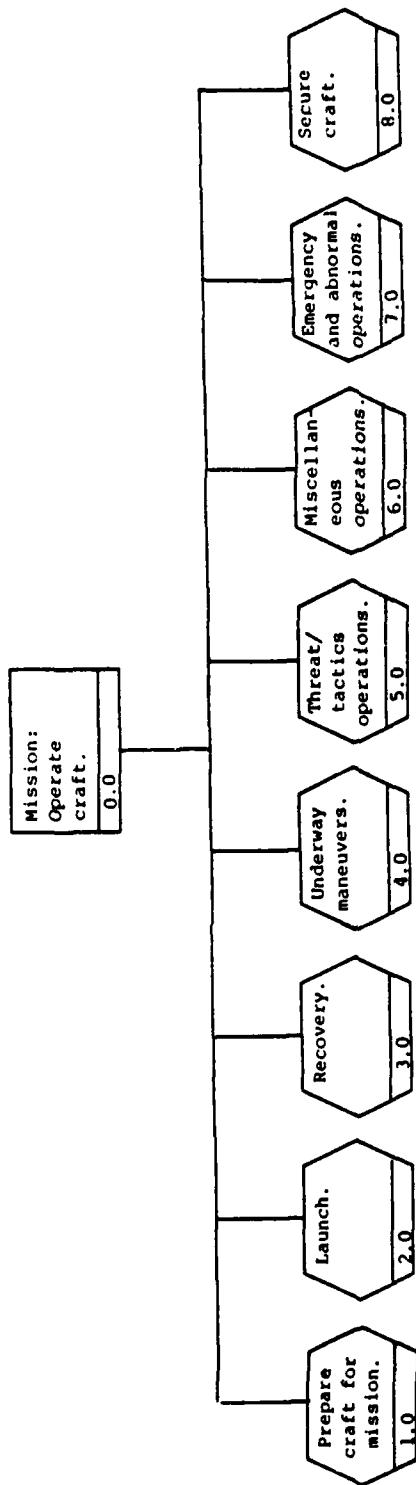


Figure 2. Mission Phases Flowchart

TASK LISTING FOR LCAC OPERATOR

PHASE 1.0 - PRELAUNCH

| NUMBER | TASK  | CONDITIONS   |
|--------|---|--|
| 1.0    | Prepare craft for mission.                                | Given both operator and assistant operator aboard, pre-mission briefing completed, and mission/operations plan filed with operations office. |
| 1.1    | Receive and review mission orders.                        | Given mission orders (destination coordinates, load, estimated time of departure/arrival, station contacts).                                 |
| 1.2    | Receive and review weather information.                   | Given prescribed weather station information.  |
| 1.3    | Review tides information.                                 | Given current tide tables.   |
| 1.4    | Review visual inspection discrepancy system (VIDS) cards. | Given access to VIDS board in maintenance control office.  |
| 1.5    | Review fuel loading status.                               | Given fuel distribution and fuel requirements for mission.   |
| 1.6    | Supervise cargo loading.                                  | Given established cargo, fuel and loads.   |
| 1.6.1  | Receive and review load plan.                             | Given load plan from operations.   |
| 1.6.2  | Supervise cargo containment and distribution.             | Given weight and balance configuration.  |
| 1.6.3  | Supervise cargo tie down.                                 | Given manpower and appropriate tie down equipment.   |
| 1.7    | Obtain clearance.   | Given clearance for route from Coast Guard/military, and clearances from loadmaster, and maintenance control                                 |
| 1.8    | Obtain radio frequencies.                                 | Given mission frequencies from base communications.  |

PHASE 1.0 - PRELAUNCH

| NUMBER | TASK                                   | CONDITIONS  |
|--------|--|---|
| 1.9    | Perform pre-mission inspection.        | Given pre-mission inspection checklist and maintenance discrepancies log. |
| 1.10   | Perform control cabin inspection.      | Given control cabin inspection checklist.                                 |
| 1.11   | Direct operating crew station manning. | Given crew aboard craft.  |

PHASE 2.0 - LAUNCH

| NUMBER | TASK   | CONDITIONS  |
|--------|--|---|
| 2.0    | Launch craft.                                      | Given pre-launch requirements completed, recommended crew on board, appropriate checklists and clearances.                          |
| 2.1    | Start craft.                                       | Given recommended crew aboard (operator, assistant operator, navigator).  |
| 2.1.1  | Perform power-off checklist procedures.            | Given power-off checklist, check status of all instrument panels.   |
| 2.1.2  | Establish and maintain electronic communication.   | With ramp marshall, bridge and wave commander.  |
| 2.1.3  | Establish and maintain visual contact.             | With ramp marshall, with aid of windshield washers, wipers and de-icer, if required.  |
| 2.1.4  | State intention to start APUs.                     | Given notification to ramp marshall and base or support ship bridge.  |
| 2.1.5  | Perform APU start checklist procedures.            | Given APU start checklist. If external power is available, proceed to external power start; if not, proceed to battery power start. |
| 2.1.6  | Perform pre-start checklist procedures.            | Given pre-start checklist.  |
| 2.1.7  | Perform main engine(s) start checklist procedures. | Given main engine start checklist, all switches set as required, indicator and warning lights ON/OFF as required.                   |
| 2.1.8  | Control fires.                                     | If necessary. (see section 7.2, "Perform fire emergency procedures.")   |

PHASE 2.0 - LAUNCH

| NUMBER  | TASK   | CONDITIONS  |
|---------|--|---|
| 2.2     | Lift off and hover (over land).                  | Given all available information on environment and craft control settings before commencing lift-off.                         |
| 2.2.1   | Perform pre-underway checklist procedures.       | Given pre-underway checklist, crew stationed for lift-off; given lift-off clearance from base or support ship.                |
| 2.2.2   | Perform lift-off and hover checklist procedures. | Given lift-off and hover checklist; given announcement of intention to lift-off to all concerned.                             |
| 2.2.3   | Hold craft steady on cushion.                    | With aid of primary and secondary controls, as necessary.   |
| 2.3     | Lift off and hover (over water).                 | Given all available information on environment and craft control settings before commencing lift-off.                         |
| 2.3.1   | Perform pre-underway checklist procedures.       | Given pre-underway checklist, crew stationed for lift-off; given lift-off clearance from base or support ship.                |
| 2.3.2   | Perform lift-off and hover checklist procedures. | Given lift-off and hover checklist, given announcement of intention to lift-off to all concerned.                             |
| 2.3.2.1 | Drain water from seal system.                    | If craft has been hullborne more than 30 seconds.   |
| 2.3.3   | Hold craft steady on cushion.                    | With aid of prop pitch, rudder or bow thrusters, as required.   |
| 2.4     | Depart area (on cushion).                        | Given cushion borne craft, all recommended crew on board, wind and weather information, and assurance of total craft control. |
| 2.4.1   | Transit land to water.                           | Given ramp, slipway or beach and calm water or surf.  |

PHASE 2.0 - LAUNCH

| NUMBER    | TASK   | CONDITIONS   |
|-----------|--|--|
| 2.4.1.1   | Perform land (ramp or slipway) to calm water transition. | Given cushion borne craft and aid of assistant operator.   |
| 2.4.1.1.1 | Obtain clearance.  | As required.   |
| 2.4.1.1.2 | Ensure clear departure path.                             | Given clearance from radar/navigation and visual observation.  |
| 2.4.1.1.3 | Maneuver to outbound heading.                            | Given assurance of total craft control; given heading from radar/navigation.   |
| 2.4.1.1.4 | Perform land to water transition.                        | Given option of cruise mode to assure sufficient speed upon reaching water (above hump) and to reduce spray generation.  |
| 2.4.1.2   | Perform land (beach) to surf transition.                 | Given plunging surf of four feet or greater.   |
| 2.4.1.2.1 | Determine wave patterns and frequency.                   | Given plunging surf, to arrive at surf line during reduced wave period.  |
| 2.4.1.2.2 | Obtain clearance.  | As required.   |
| 2.4.1.2.3 | Ensure clear departure path.                             | Given clearance from radar/navigation and visual observation.  |
| 2.4.1.2.4 | Maneuver to outbound heading.                            | Given heading from radar/navigation.   |
| 2.4.1.2.5 | Perform beach to surf transition.                        | Given that beach be traversed on track such that surf line is crossed at angle of $90 \pm 10$ degrees; given introduction of prop pitch to overcome speed reduction on wave impact; given high cushion flow rate to reduce drag. |
| 2.4.2     | Exit welldeck (on cushion).                              | Given LSD location, wet or dry well, and self-propelled mode, and sea state from one to four.  |

PHASE 2.0 - LAUNCH

| NUMBER    | TASK   | CONDITIONS   |
|-----------|--|--|
| 2.4.2.1   | Exit dry well.                                       | Given clearance from support ship bridge, given release of aft lines by well deck personnel.   |
| 2.4.2.1.1 | Set bow thruster mode switch to REV thrust position. | Given control mode, and bow thruster mode switch to REV.   |
| 2.4.2.1.2 | Set port and starboard $N_2$ to MIN.                 | Given port and starboard $N_2$ set at MIN.   |
| 2.4.2.1.3 | Increase $N_1$ to MAX PWR.                           | Slowly. $N_2$ should not increase over 55 percent.   |
| 2.4.2.1.4 | Bring craft on cushion.                              | By increasing $N_2$ as required for design weight, given all engines on line, percent $N_2$ dependent on load.   |
| 2.4.2.1.5 | Adjust cushion vanes.                                | As required.   |
| 2.4.2.1.6 | Perform well deck exit.                              | With aid of prop, rudder and bow thruster to control exit.   |
| 2.4.2.1.7 | Maneuver to outbound heading.                        | Given all engines on line, release of all remaining lines by line handlers.  |
| 2.4.2.2   | Exit wet well  | Given clearance from support ship bridge, given release of aft lines by well deck personnel; given support ship with wet well water level up to four feet. |
| 2.4.2.2.1 | Set bow thruster mode switch to REV thrust position. | Given control mode and bow thruster mode switch to REV.  |
| 2.4.2.2.2 | Set port and starboard $N_2$ to MIN.                 | Given port and starboard $N_2$ set at MIN.   |
| 2.4.2.2.3 | Increase $N_1$ to MAX PWR.                           | Slowly. $N_2$ should not increase over 55%.  |

PHASE 2.0 - LAUNCH

| NUMBER    | TASK                          | CONDITIONS  |
|-----------|-------------------------------|---|
| 2.4.2.2.4 | Perform well deck exit.       | With aid of prop, rudder and bow thruster to control exit.                  |
| 2.4.2.2.5 | Maneuver to outbound heading. | Given all engines on line, release of all remaining lines by line handlers. |

PHASE 3.0 - RECOVER

| NUMBER  | TASK   | CONDITIONS   |
|---------|--|--|
| 3.0     | Recover craft                                    | Given underway craft and ramp, dock, buoy, anchor site, or LSD.            |
| 3.1     | Transit water to land.                           | Given calm water, heading to land line $90 \pm 45$ degrees.                |
| 3.1.1   | Perform calm water approach at sub-hump speeds.  | With bow thruster in reverse thrus tmode, use prop pitch to control speed. |
| 3.1.1.1 | Obtain clearance.                                | As required.   |
| 3.1.1.2 | Ensure clear approach path.                      | Given clearance from radar/navigation and visual observation.              |
| 3.1.2   | Perform calm water approach at over hump speeds. | With bow thruster in forward thrust mode.                                  |
| 3.1.2.1 | Obtain clearance.                                | As required.   |
| 3.1.2.2 | Ensure clear approach path.                      | Given clearance from radar/navigation and visual observation.              |
| 3.1.2.3 | Align craft on desired track.                    | Given heading from radar/navigation.                                       |
| 3.1.2.4 | Study prevailing winds.                          | Given wind velocity and direction indicators.                              |
| 3.1.2.5 | Determine effect of winds on craft.              | Given information on wind forces and craft heading and speed.              |
| 3.1.2.6 | Reduce prop pitch.                               | As necessary, depending on prevailing winds and craft speeds.              |
| 3.1.2.7 | Reposition bow thruster to REV thrust mode.      | As necessary.  |
| 3.1.2.8 | Adjust prop pitch.                               | As required to control speed.  |
| 3.2     | Moor to a dock/pier.                             | Given current, sea state, wind and weather information.                    |
| 3.2.1   | Perform dock approach.                           | Given consideration to welfare of onboard and shore line handlers.         |

PHASE 3.0 - RECOVER

| NUMBER    | TASK                                     | CONDITIONS   |
|-----------|--|--|
| 3.2.1.1   | Set bow thrusters to REV thrust mode.    | As necessary for craft control.  |
| 3.2.1.2   | Maintain $N_2$ .                         | As required given design gross weight.   |
| 3.2.1.3   | Set prop pitch.                          | As necessary, to maintain speed of approximately two knots.  |
| 3.2.1.4   | Set cushion vanes.                       | As required, given extreme bag-wharf height differences, given spray suppression requirements.   |
| 3.2.1.5   | Start approach.                          | Given craft bow line handlers and approximately 1.5 knot closing velocity.   |
| 3.2.1.5.1 | Adjust prop pitch.                       | While still away from wharf, to reduce headway to near zero.   |
| 3.2.1.6   | Make soft bow/wharf contact.             | Given near zero approach speed.  |
| 3.2.1.7   | Hold position.                           | With small amounts of positive prop pitch.   |
| 3.2.2     | Secure craft to dock/pier.               | Given aid of line handlers and appropriate equipment.  |
| 3.3       | Moor to buoy.                            | Given approved bridle and necessary equipment; given line handlers, messengers and visual or radio communication, where appropriate, in sea states of one through four, wind up to 25 knots, and hullborne mode. |
| 3.3.1     | Perform buoy approach.                   | Given conditions of tidal movements and winds.   |
| 3.3.1.1   | Assess effects of seas and winds.        | Given available information on winds, sea states and craft speed.  |
| 3.3.1.2   | Align craft heading into dominant force. | Given wind and sea conditions.   |

PHASE 3.0 - RECOVERY

| NUMBER   | TASK   | CONDITIONS  |
|----------|--|---|
| 3.3.1.3  | Set bow thruster to REV thrust mode.                             | Prior to starting approach.   |
| 3.3.1.4  | Maintain $N_2$ .   | As required, given design gross weight.   |
| 3.3.1.5  | Set prop pitch.  | As necessary, to maintain speed of approximately two knots.   |
| 3.3.1.6  | Set cushion vanes.   | Given spray suppression requirements.   |
| 3.3.1.7  | Start approach.  | Given approach speeds of 1.5 knots or less, with bow line handlers on station.  |
| 3.3.1.8  | Adjust prop pitch.   | To reduce headway to near zero.   |
| 3.3.1.9  | Make soft contact with buoy.                                     | Given near zero approach speed.   |
| 3.3.1.10 | Hold position.   | With small amounts of positive prop pitch, while lines are secured.   |
| 3.3.2    | Secure craft to buoy.  | Given line-handlers and appropriate equipment.  |
| 3.4      | Anchor.  | Given required equipment (anchors and lines); given maximum water depth of 40 - 45 feet, given information on bottom composition, given environmental conditions (current - up to 5 knots, wind to 25 knots, sea state up to four), and hullborne mode. |
| 3.4.1    | Assess effects of tidal conditions and winds on hullborne craft. | Given tide tables and wind speed and velocity indicators.   |
| 3.4.2    | Reduce forward speed to zero.                                    | Given three control inputs.   |

PHASE 3.0 - RECOVER

| NUMBER  | TASK                             | CONDITIONS  |
|---------|----------------------------------|---|
| 3.4.3   | Maintain heading.                | Given heading into dominant force (wind or seas) and three control inputs.                                      |
| 3.4.4   | Drop anchor(s).                  | Given cushion fully depleted, with aid of line handlers and with station observer monitoring anchor drop.       |
| 3.4.5   | Set anchor(s).                   | Given procedures for setting anchor(s), according to operator's manual.   |
| 3.4.6   | Secure all main engines.         | Given engine shutdown checklist.  |
| 3.5     | Enter welldeck (self-propelled). | Given return to LSD, wet or dry well, self-propelled mode, and sea state from one to four, wind up to 25 knots. |
| 3.5.1   | Enter dry well.                  | In low speed/on cushion mode of operation, given support ship speed of 10 knots or less.                        |
| 3.5.1.1 | Obtain clearance.                | Given clearance from support ship bridge.   |
| 3.5.1.2 | Ensure clear approach path.      | Given clearance from radar/navigation and visual observation.   |
| 3.5.1.3 | Set $N_2$ .                      | As required, dependent on load.   |
| 3.5.1.4 | Adjust cushion vanes.            | As necessary.   |
| 3.5.1.5 | Approach support ship.           | On cushion, with increased prop pitch, as required.   |
| 3.5.1.6 | Perform station-keeping.         | Given ship motions, craft motions and relative motions within acceptable limits.                                |
| 3.5.1.7 | Hold position.                   | Just astern of support ship, with bow thruster mode switch in REV position.                                     |

PHASE 3.0 - RECOVERY

| NUMBER    | TASK                          | CONDITIONS  |
|-----------|-------------------------------|---|
| 3.5.1.8   | Proceed with entry.           | Given use of rudder, bow thrusters and differential prop pitch to provide control.  |
| 3.5.1.8.1 | Reduce prop pitch.            | Given a tendency to accelerate as craft enters well deck. Dry entry requires craft to transverse stern wave and one-foot high stern seal. |
| 3.5.1.9   | Come off cushion.             | When in position inside well deck.  |
| 3.5.1.10  | Secure craft to support ship. | Given line-handlers and appropriate equipment.  |
| 3.5.2     | Enter wet well.               | In low speed hullborne mode of operation, given support ship speeds between 1 - 3 knots.  |
| 3.5.2.1   | Obtain clearance.             | Given clearance from support ship bridge.   |
| 3.5.2.2   | Ensure clear approach path.   | Given clearance from radar/navigation and visual observation.   |
| 3.5.2.3   | Approach support ship.        | On cushion, with increased prop pitch as necessary.   |
| 3.5.2.4   | Perform station-keeping.      | Given ship motions, craft motions and relative motions within acceptable limits.  |
| 3.5.2.5   | Hold position.                | Just astern of support ship, with bow thruster mode switch in REV position.   |
| 3.5.2.5.1 | Set $N_2$ .                   | As required, dependent on load.   |
| 3.5.2.5.2 | Adjust cushion vanes.         | As required for spray suppression.  |
| 3.5.2.5.3 | Set prop pitch.               | As required, to hold position in hullborne mode.  |

PHASE 3.0 - RECOVERY

| NUMBER  | TASK                              | CONDITIONS   |
|---------|-----------------------------------|--|
| 3.5.2.6 | Proceed with entry.               | With combination of rudder, bow thrusters and prop pitch.<br>Caution: Bow thruster inputs must be limited to prevent them from striking support ship side structure. |
| 3.5.2.7 | Secure craft to support ship.     | Given line-handlers and appropriate equipment.   |
| 3.6     | Moor alongside ship.              | Given return to LSD, ship at anchor or underway.   |
| 3.6.1   | Moor alongside ship at anchor.    | Given cushionborne craft with pre-rigged mooring lines.  |
| 3.6.1.1 | Maneuver craft close to station.  | To permit transfer of messenger lines from craft to support ship.  |
| 3.6.1.2 | Maneuver craft to final position. | After all lines are properly attached and deployed, given craft attitude perpendicular to side of ship.  |
| 3.6.1.3 | Come off cushion.                 | $N_2$ set at MIN.  |
| 3.6.1.4 | Adjust craft orientation.         | By use of mooring lines, given craft bow nestled against fenders, and aid of line handlers.  |
| 3.6.1.5 | Secure to ship.                   | Given line-handlers and appropriate equipment.   |
| 3.6.2   | Moor alongside ship underway.     | Given support ship speeds, winds and sea states.   |
| 3.6.2.1 | Maneuver craft close to station.  | To permit transfer of forward messenger lines from craft to support ship.  |
| 3.6.2.2 | Maneuver craft to final position. | After all lines are properly attached and deployed, given craft attitude perpendicular to side of ship.  |

PHASE 3.0 - RECOVERY

| NUMBER  | TASK                               | CONDITIONS  |
|---------|------------------------------------|---|
| 3.6.2.3 | Maintain cushion.                  | With N <sub>2</sub> controls, as required.  |
| 3.6.2.4 | Perform station-keeping.           | With adjustments to prop pitch, as necessary.   |
| 3.6.2.5 | Adjust craft orientation.          | By use of mooring lines, given craft side against fenders, and aid of line handlers.  |
| 3.6.2.6 | Secure to ship.                    | Given line-handlers and appropriate equipment.  |
| 3.7     | Perform <u>emergency</u> recovery. | Given disabled, hullborne craft. Craft will be towed in using wet welldeck tow-in procedure, with 4½ feet of water in welldeck to prevent seal and finger damage. (See 7.7 - Perform miscellaneous abnormal procedures). <span style="float: right;">X</span> |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER  | TASK  | CONDITIONS  |
|---------|---|---|
| 4.0     | Perform underway maneuvers.                                       | Given self-propelled craft, environmental conditions, appropriate clearances, and assurance of total craft control.   |
| 4.1     | Perform overwater operations.                                     | Given wind and sea state information, self-propelled mode of operation.   |
| 4.1.1   | Operate craft at below hump speeds (on cushion, self-propelled).  | Given assigned heading, cushion borne craft, all control inputs, and aid of assistant operator as required.   |
| 4.1.1.1 | Maintain straight-line course and speed (or hold craft on track). | With/without crosswinds, sea states up to four, minimum/maximum cargo, yaw moment, using combination of bow thruster, rudder and prop pitch inputs.                                     |
| 4.1.1.2 | Change course.  | Given conditions of heading changes, craft speeds, and wind direction relative to initial and turn-in craft heading. (Three control inputs, with/without cargo, with minimum sideslip.) |
| 4.1.1.3 | Stop craft.   | Given use of bow thrusters and prop pitch at approximately +10 degrees.   |
| 4.1.1.4 | Perform spot turn.  | About craft center, with aid of differential propeller pitch.   |
| 4.1.1.5 | Hold craft stable.  | Given three control inputs.   |
| 4.1.1.6 | Perform lateral translation.                                      | Given three control inputs.   |
| 4.1.1.7 | Perform forward movement.   | Given three control inputs.   |
| 4.1.1.8 | Perform rearward movement.  | Given three control inputs.   |
| 4.1.2   | Perform close-in maneuvers.                                       | Given assurance of total craft control.   |
| 4.1.2.1 | Approach a stationary object (wharf, buoy, ship).                 | Given displacement mode.  |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER  | TASK  | CONDITIONS  |
|---------|---|---|
| 4.1.2.2 | Approach a moving ship (on cushion).                              | Given on-cushion mode of operation, given ship heading, ship speeds, line handlers, messengers, visual or radio communication, and self-propelled.                                    |
| 4.1.2.3 | Approach a moving ship. (hullborne).                              | Given wind conditions, ship heading and speeds, boating mode, line handlers, messengers, visual or radio communication, and self-propelled mode.                                      |
| 4.1.3   | Perform transition over hump (accelerate through hump).           | Given craft alignment on pre-determined heading, bow thrusters in FWD thrust mode, prop pitch levers in high forward blade angle, rudder control.                                     |
| 4.1.3.1 | Accelerate through hump in deep water.                            | Given wind conditions; gross weight and cargo distribution.   |
| 4.1.3.2 | Accelerate through hump in shallow water.                         | Given water depth of 10 - 20 feet, and increased power; given wind conditions, gross weight and cargo distribution.   |
| 4.1.4   | Operate craft at above hump speeds.                               | Given cushionborne mode and clearance from radar/navigation.  |
| 4.1.4.1 | Maintain straight-line course and speed.                          | Given craft speeds, winds, sea states, and three control inputs.  |
| 4.1.4.2 | Change course.  | Given conditions of heading changes, craft speeds, and wind direction relative to initial and in-turn craft heading, three control inputs, with/without cargo, with minimum sideslip. |
| 4.1.4.3 | Maintain position in formation transit. (perform station keeping) | Given heading from radar/navigation.  |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER  | TASK   | CONDITIONS   |
|---------|--|--|
| 4.1.4.4 | Turn craft through three successive turns.           | While remaining in a marked sea lane or river channel.   |
| 4.1.5   | Perform underway main engine water wash.             | Given main engine water wash checklist.  |
| 4.1.6   | Perform normal stopping procedures.                  | Given initial conditions of reverse thrust on bow thrusters and zero prop pitch, and subsequent prop pitch adjustments as required to effect controlled stop.  |
| 4.1.7   | Bring craft off cushion.                             | Given all craft motion stopped and rate of descent controlled by use of $N_2$ levers.  |
| 4.1.8   | Operate craft at below hump speeds, in boating mode. | Given self-propelled mode of operation, given wind and sea state information.  |
| 4.1.8.1 | Perform hullborne operation procedures.              | Given adequate water depth to prevent skirt or bottom damage, given cushion trim vanes closed, bow thruster vane levers at OPEN, bow thruster OPER/STOW switch at OPER, bow thruster FWD/REV switch at FWD, and increased power as required. |
| 4.1.8.2 | Maintain straight-line course and speed.             | With/without crosswinds, sea states up to four, minimum/maximum cargo, yaw moment, using combination of bow thruster, rudder and prop inputs.  |
| 4.1.8.3 | Change course.                                       | Given heading changes, craft speeds, and wind direction relative to initial and in-turn craft, heading three control inputs, with/without cargo, with minimum sideslip.  |
| 4.1.8.4 | Hold craft stable.                                   | Given three control inputs.  |
| 4.1.8.5 | Perform forward movement.                            | Given three control inputs.  |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER  | TASK   | CONDITIONS  |
|---------|--|---|
| 4.1.8.6 | Perform rearward movement.                       | Given three control inputs.   |
| 4.1.9   | Bring craft on cushion.                          | Given hullborne craft and lift-off and hover checklist.   |
| 4.1.9.1 | Perform lift-off and hover checklist procedures. | Given lift-off and hover checklist given announcement of intention to lift-off to all concerned.  |
| 4.1.9.2 | Drain water from seal system.                    | If craft has been hullborne more than 30 seconds.   |
| 4.2     | Transit water to land (beach).                   | Given craft speeds, surf and wind conditions and total craft control.   |
| 4.2.1   | Perform calm water approach at sub-hump speeds.  | Given calm water, heading to surf line $90 \pm 45$ degrees, bow thruster in reverse thrust mode, with aid of prop pitch to control speed. |
| 4.2.1.1 | Obtain clearance.                                | As required.  |
| 4.2.1.2 | Ensure approach path is clear.                   | Given clearance from radar/navigation and visual observation.   |
| 4.2.2   | Perform calm water approach at over-hump speeds. | Given calm water, heading to surf line $90 \pm 45$ degrees, bow thruster in forward thrust mode.  |
| 4.2.2.1 | Obtain clearance.                                | As required.  |
| 4.2.2.2 | Ensure approach path is clear.                   | Given clearance from radar/navigation.  |
| 4.2.2.3 | Align craft on desired track.                    | Given heading from radar/navigation.  |
| 4.2.2.4 | Study prevailing winds.                          | Given wind velocity and direction indicators.   |
| 4.2.2.5 | Determine effect of winds on craft.              | Given craft speeds, and wind information.   |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER    | TASK  | CONDITIONS  |
|-----------|---|---|
| 4.2.2.6   | Reduce prop pitch.                          | As necessary.   |
| 4.2.2.7   | Reposition bow thruster to REV thrust mode. | As required.  |
| 4.2.2.8   | Adjust prop pitch.                          | As required to control speed.   |
| 4.2.3     | Perform surf approach.                      | Given surf, heading to surf line.   |
| 4.2.3.1   | Transit low surf.                           | Given 0-4 foot surf, $90 \pm 45$ degrees heading to surf line, speeds up to 50 knots.   |
| 4.2.3.1.1 | Obtain clearance.                           | As required.  |
| 4.2.3.1.2 | Ensure clear approach path.                 | Given clearance from radar/navigation and visual observation.   |
| 4.2.3.1.3 | Align craft on approach path.               | Given approach path $90 \pm 45$ degrees heading to surf line.   |
| 4.2.3.2   | Transit medium surf.                        | Given 4-8 foot surf, $90 \pm 10$ degrees heading to surf line, speeds up to 30 knots.   |
| 4.2.3.2.1 | Obtain clearance.                           | As required.  |
| 4.2.3.2.2 | Ensure clear approach path.                 | Given clearance from radar/navigation and visual observation.   |
| 4.2.3.2.3 | Align craft on approach path.               | Given approach path $90 \pm 10$ degrees heading to surf line.   |
| 4.2.3.2.4 | Match craft speed to wave speed..           | With aid of prop pitch, to follow wave crest to beach.  |
| 4.2.3.3   | Transit high surf.                          | Given high surf, $90 \pm 10$ degrees heading to surf line, speed up to 20 knots, given wind conditions, slope angle and craft gross weight. |
| 4.2.3.3.1 | Obtain clearance.                           | As required.  |
| 4.2.3.3.2 | Ensure clear approach path.                 | Given clearance from radar/navigation and visual observation.   |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER    | TASK  | CONDITIONS  |
|-----------|---|---|
| 4.2.3.3.3 | Align craft on approach path.                   | Given approach path $90 \pm 10$ degrees heading to surf line.   |
| 4.2.3.3.4 | Match craft speed to wave speed.                | With aid of prop pitch, to follow wave crest to beach.  |
| 4.2.3.3.5 | Reverse bow thrusters.                          | At top of beach, or as required, for low-speed maneuvering.   |
| 4.3       | Perform overland operations.                    | Given local environmental conditions, craft configurations, wind and weather conditions, and knowledge of craft operating limits.   |
| 4.3.1     | Maintain straight course over level ground.     | Given location coordinates, heading, wind velocity and direction, weeds, marsh, tall grasses, sand, concrete, ice, etc.   |
| 4.3.2     | Maintain straight course over topography.       | Given ditches, ridges, hillocks and snowbanks of no more than 4 feet of difference from mean ground level.  |
| 4.3.2.1   | Study terrain constantly.                       | To determine grades, depressions and obstacles to be avoided.   |
| 4.3.2.2   | Maintain full cushion.                          | With $N_2$ setting as required.   |
| 4.3.2.3   | Maintain control of bow with thrusters.         | Given REV mode to maintain prop pitch.  |
| 4.3.3     | Maintain straight course over obstacles.        | Given discrete and/or continuous obstacles (spikes, small trees, low wall), given appropriate approach speeds to avoid immobilizing craft and to avoid tearing of seal bag. |
| 4.3.4     | Maintain straight course across face of a hill. | Given craft aligned up the slope with aid of all controls.  |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER   | TASK  | CONDITIONS   |
|----------|---|--|
| 4.3.5    | Maintain straight course up a slope.                        | Given approach heading to slope $90 \pm 20$ degrees from line of slope, given slope gradient, and increased prop pitch as required.                                  |
| 4.3.6    | Maintain straight course down a slope, forward or rearward. | Given approach heading to slope $90 \pm 20$ degrees from line of slope, given slope gradient, and decreased prop pitch as required.                                  |
| 4.3.7    | Hold craft on track in yaw moment.                          | Given three control inputs.  |
| 4.3.8    | Perform normal stopping (over land).                        | Given <u>initial conditions of reverse thrust on bow thrusters and zero prop pitch, and subsequent prop pitch adjustments as required to effect controlled stop.</u> |
| 4.3.8.1  | Set prop pitch levers at zero pitch.                        | Set as required to allow bow thrusters to stop craft.  |
| 4.3.8.2  | Set bow thrusters in reverse thrust position.               | To stop craft.   |
| 4.3.9    | Hover over land.  | Given use of primary and secondary controls as required.   |
| 4.3.9.1  | Hover over level ground.                                    | Given use of primary and secondary controls as required.   |
| 4.3.9.2  | Hover over a slope.   | Given bow position up-hill heading.  |
| 4.3.10   | Come off cushion (over land).                               | Given all craft motion stopped, and rate of descent controlled by $N_2$ levers.  |
| 4.3.10.1 | Come off cushion over level ground.                         | Given level terrain and contact with all four landing pads.  |
| 4.3.10.2 | Come off cushion on a slope.                                | Given minimum practical $N_2$ setting and slightly increased prop pitch setting.   |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER   | TASK   | CONDITIONS   |
|----------|--|--|
| 4.3.11   | Discharge/receive cargo on land.               | Given relatively level terrain, and all four landing pads in contact with ground, propellers in zero pitch, engines at idle.   |
| 4.3.11.1 | Lower bow ramp.                                | Given solid ground contact to avoid ramp warping, and use of naturally stepped terrain if possible. <span style="float: right;">X</span>                               |
| 4.3.11.2 | Supervise cargo loading/unloading.             | Within longitudinal and lateral centers of gravity and weight limits.  |
| 4.3.11.3 | Secure bow ramp.                               | Given hydraulic power.   |
| 4.3.12   | Lift off and hover (over land).                | Given lift-off and hover checklist, given announcement of intention to lift off to all concerned.  |
| 4.3.12.1 | Come on cushion over level ground.             | Given lift-off and hover checklist and level terrain.  |
| 4.3.12.2 | Come on cushion on a slope.                    | Given lift-off and hover checklist and sloped terrain.   |
| 4.3.13   | Perform spot turn (overland).                  | About craft center, with aid of all controls.  |
| 4.3.14   | Change course.                                 | Given conditions of heading changes, craft speeds and wind direction relative to initial and in-turn craft heading, with aid of prop pitch, bow thrusters and rudders. |
| 4.3.15   | Perform lateral translation.                   | Given coordination of all controls.  |
| 4.3.15.1 | Perform lateral translation over level ground. | Given three control inputs.  |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER   | TASK                                    | CONDITIONS  |
|----------|---|---|
| 4.3.15.2 | Perform lateral translation on a slope. | Given craft alignment normal to slope and use of three control inputs.                  |
| 4.3.16   | Perform forward movement.               | Given level or sloped terrain and path free of obstacles.                               |
| 4.3.16.1 | Move forward over level ground.         | Given three control inputs.   |
| 4.3.16.2 | Move forward over a slope.              | Given three control inputs.   |
| 4.3.17   | Perform rearward movement.              | Given level or sloped terrain and path free of obstacles.                               |
| 4.3.17.1 | Move rearward over level ground.        | Given three control inputs.   |
| 4.3.17.2 | Move rearward on a slope.               | With bow thruster in forward thrust mode, and use of prop pitch to control slide speed. |
| 4.3.18   | Perform rapid acceleration.             | Given maximum recommended speed, wind conditions, level terrain.                        |
| 4.4      | Transit land (beach) to water.          | Given plunging surf of 4 feet or greater. <i>SM 3.1</i>                                 |
| 4.4.1    | Determine wave patterns and frequency.  | Given plunging surf, to arrive at surf line during reduced wave period.                 |
| 4.4.2    | Obtain clearance.                       | As required.  |
| 4.4.3    | Ensure clear departure path             | Given clearance from radar/navigation and visual observation.                           |
| 4.4.4    | Maneuver to outbound heading.           | Given three control inputs.   |

PHASE 4.0 - UNDERWAY MANEUVERS

| NUMBER | TASK                              | CONDITIONS  |
|--------|-----------------------------------|---|
| 4.4.5  | Perform beach to surf transition. | Given that beach be traversed on track such that surf line is crossed at an angle of $90 \pm 10$ degrees; given introduction of prop pitch to overcome speed reduction on wave impact; given high cushion flow rate to reduce drag. |

PHASE 5.0 - THREAT/TACTICS OPERATIONS

| NUMBER | TASK                               | CONDITIONS                    |
|--------|------------------------------------|-------------------------------|
| 5.0    | Perform threat/tactics operations. | Classified/under development. |
| 5.1    | Air                                | Classified.                   |
| 5.2    | Surface                            | Classified.                   |
| 5.3    | Sub-surface (mines).               | Classified.                   |
| 5.4    | Land threats                       | Classified.                   |
| 5.5    | Evasive maneuvers                  | Classified.                   |
| 5.6    | Initial assault tactics            | Classified.                   |
| 5.7    | Withdrawal tactics.                | Classified.                   |

PHASE 6.0 - MISCELLANEOUS OPERATIONS

| NUMBER | TASK                                    | CONDITIONS   |
|--------|---|--|
| 6.0    | Perform miscellaneous operations.       | Given low-visibility, heavy weather, ice, or underway refueling required.  |
| 6.1    | Operate craft at night.                 | Given updated light lists and charts aboard craft, and radar watch maintained.   |
| 6.1.1  | Verify craft lights are operational.    | Given craft navigation lights, cabin lights, and instrument lights operational.  |
| 6.1.2  | <u>Plot craft course.</u>               | Given congested areas, harbors, etc., noting significant navigational aids.  |
| 6.1.3  | Ensure that radar is operational.       | Given qualified radar operator.  |
| 6.2    | Perform low visibility operations.      | Given fog, mist, or heavy rain, and use of required fog signals. Given radar watch maintained, as needed.  |
| 6.2.1  | Maintain prudent speed.                 | Given craft speed and visibility such that stopping distance is one-half limit of visibility.  |
| 6.3    | Perform heavy weather operations.       | Given adverse weather conditions, retained power, safe speeds, secured cargo area and equipment.   |
| 6.3.1  | Seek nearest shelter or return to port. | Given distance and heading from radar/navigation.  |
| 6.4    | Perform winter operations.              | Given ice or snowfields and periodic cycling of primary controls to reduce ice buildup; given periodic stops to remove snow and ice from craft deck. |
| 6.5    | Perform ice-breaking operations.        | Given periodic stops to remove snow and ice from craft deck and equipment.   |
| 6.5.1  | Perform low-speed ice-breaking.         | Given thick ice.   |

PHASE 6.0 - MISCELLANEOUS OPERATIONS

| NUMBER  | TASK   | CONDITIONS   |
|---------|--|--|
| 6.5.2   | Perform high-speed ice-breaking.                       | Given thin ice.  |
| 6.6     | Perform underway refueling.                            | Given refueling checklist.   |
| 6.6.1   | Moor to a buoy, pier or ship at anchor for refueling.  | Given location of refueling site, and appropriate manpower and equipment.  |
| 6.6.1.1 | Position craft.  | Given refueling site and craft orientation requirements.   |
| 6.6.1.2 | Secure craft to buoy, pier or ship.                    | Given line handlers and appropriate equipment.   |
| 6.6.1.3 | Perform gravity refueling.                             | In accordance with standard operating procedures.  |
| 6.6.1.4 | Perform pressurized refueling.                         | In accordance with standard operating procedures.  |
| 6.6.2   | Moor alongside ship underway for refueling.            | Given support ship location, line-handlers, and appropriate equipment, in accordance with standard operating procedures.                         |
| 6.6.3   | Enter well deck for refueling.                         | Given LSD location, wet or dry well, clearance from bridge, and appropriate equipment.   |
| 6.6.4   | Perform station-keeping at ship's stern for refueling. | Given LSD location, craft and LSD speeds and relative speeds, required equipment and manpower, in accordance with standard operating procedures. |

PHASE 7.0 - EMERGENCY AND ABNORMAL OPERATIONS

| NUMBER | TASK   | CONDITIONS  |
|--------|--|---|
| 7.0    | Perform emergency and abnormal operations.                     | Given emergency and abnormal conditions.  |
| 7.1    | Perform emergency stopping procedures over land or over water. | Given plow-in or danger of collision.   |
| 7.1.1  | Select REV mode on bow thruster.                               | Immediately.  |
| 7.1.2  | Select full reverse pitch.                                     | To allow stopping.  |
| 7.1.3  | Decrease $N_2$ to MIN.   | Given decision on imminence of collision, and aid of assistant operator.  |
| 7.1.4  | Place all $N_1$ levers in IDLE position.                       | Given unavoidable collision, to dump cushion in extreme emergencies only; given aid of assistant operator.      |
| 7.1.5  | Shut down craft.   | If impact is unavoidable, given engine shutdown checklist, and all fuel valves and electrical systems shut off. |
| 7.2    | Perform plow-in recovery.                                      | Given event of plow-in (rapid deceleration combined with pitching or rolling of craft and bow down attitude).   |
| 7.2.1  | Select REV mode on bow thrusters.                              | Immediately.  |
| 7.2.2  | Increase $N_2$ to maximum.                                     | Given partially depleted cushion.   |
| 7.2.3  | Reduce prop pitch.   | As required. Conditions may require use of reverse prop pitch.  |
| 7.2.4  | Straighten craft.  | Given use of full rudder and prop pitch to augment control.   |

PHASE 7.0 - EMERGENCY AND ABNORMAL OPERATIONS

| NUMBER | TASK   | CONDITIONS  |
|--------|--|---|
| 7.3    | Perform fire emergency procedures.                           | Given a complete understanding of the craft and its systems, locations of emergency equipment and exit hatches on craft. Given leader of fire-fighting team (line handler, loadmaster, and radar operator). Given standard fire-fighting practices and procedures and checklists for craft fires. |
| 7.3.1  | Perform main propulsion engine(s) fire emergency procedures. | Given master fire light and fire pull T-handle illuminated, and main engine fire emergency procedures checklist.  |
| 7.3.2  | Perform APU fire emergency procedures.                       | Given master fire light on and flashing, audible alarm sounding, and fire pull T-handle illuminated; given APU fire emergency procedures checklist.   |
| 7.3.3  | Perform fuel equipment bay fire emergency procedures.        | Given master fire light on and flashing, audible alarm sounding, and fire pull T-handle illuminated; given fuel equipment bay fire emergency procedures checklist.  |
| 7.3.4  | Perform control station fire emergency procedures.           | Given presence of smoke and fumes; given possible drop-out of systems or erratic indicators; given control station fire emergency procedures checklist.   |
| 7.3.5  | Perform deck/cargo fire emergency procedures.                | Given smoke and flame, and/or explosion; given deck/cargo fire emergency procedures checklist.  |
| 7.4    | Perform propulsion power loss emergency procedures.          | Given loss of power and appropriate checklist(s).   |

PHASE 7.0 - EMERGENCY AND ABNORMAL OPERATIONS

| NUMBER | TASK  | CONDITIONS  |
|--------|---|---|
| 7.4.1  | Perform single engine failure emergency procedures.             | Given loss of $N_1$ and $N_2$ on failed engine, change in normal EGT (all engines), change in other engine monitors, and master caution light flashing; given single engine failure emergency procedures checklist. |
| 7.4.2  | Perform multiple engine failure emergency procedures.           | Given loss of $N_1$ and $N_2$ on failed engines, change in normal EGT, changes in other engine monitors, and master caution light flashing; given multiple engine failure emergency procedures checklist.           |
| 7.4.3  | Perform transmission failure emergency procedures.              | Given failure of any gearbox or equipment, lube oil status panel lights illuminated, vibration or noise; given transmission failure emergency procedures checklist.   |
| 7.4.4  | Perform $N_2$ govern failure emergency procedures.              | Given erratic or no control on $N_2$ ; given $N_2$ govern failure emergency procedures checklist.   |
| 7.4.5  | Perform fueling failure emergency procedures.                   | Given presence of fuel on water or craft deck or fueling monitor lights not illuminated; given fueling failure emergency procedures checklist.  |
| 7.4.6  | Perform fuel system (main engine) failure emergency procedures. | Given pressure gage below normal, fuel low pressure light on, fuel management panel low pressure light on; given fuel system (main engines) failure emergency procedures checklist.                                 |
| 7.4.7  | Perform fuel system (APU) failure emergency procedures.         | Given APU low pressure light illuminated, a change in APU rpm, secondary bus equipment dropped off line; given fuel system (APU) failure emergency procedures checklist.  |

PHASE 7.0 - EMERGENCY AND ABNORMAL OPERATIONS

| NUMBER | TASK   | CONDITIONS  |
|--------|--|---|
| 7.5    | Perform lift system failure emergency procedures.                    | Given cushion failure, loss of keel or lateral stability bags, or loss of lift fan, and appropriate checklist.  |
| 7.5.1  | Perform cushion failure emergency procedures.                        | Given change in craft attitude; given cushion failure emergency procedures checklist.   |
| 7.5.2  | Perform loss of keel or lateral stability bags emergency procedures. | Given soft roll response, large roll angle in turns, change in steering response, and/or tendency to list or crab; given loss of keel or lateral stability bags emergency procedures checklist.       |
| 7.5.3  | Perform loss of lift fan emergency procedures.                       | Given abnormal craft attitude and $N_2$ fluctuations; given loss of lift fan emergency procedures checklist.  |
| 7.6    | Perform loss of craft control emergency procedures.                  | Given failure of control system, propeller, rudder actuator, bow thruster control, APU, or generator, and appropriate checklist.  |
| 7.6.1  | Perform control system failure emergency procedures.                 | Given flight control light illuminated, given control system failure emergency procedures checklist.  |
| 7.6.2  | Perform propeller failure emergency procedures.                      | Given prop pitch change, change in craft direction, lube oil light illuminated, hydraulic annunciator light illuminated, excessive vibration; given propeller failure emergency procedures checklist. |
| 7.6.3  | Perform rudder actuator failure emergency procedures.                | Given failure of both rudders on one side and loss of control; given rudder actuator failure emergency procedures checklist.  |

PHASE 7.0 - EMERGENCY AND ABNORMAL OPERATIONS

| NUMBER  | TASK  | CONDITIONS   |
|---------|---|--|
| 7.6.4   | Perform bow thruster control loss emergency procedures. | Given annunciator flight control light and master caution lights illuminated, loss of control, and control system test panel lights illuminated; given bow thruster control loss emergency procedures checklist. |
| 7.6.5   | Perform APU failure emergency procedures.               | Given a change in APU $N_1$ rpm, and master caution light and generator-out lights on annunciator panel illuminated; given APU failure emergency procedures checklist.   |
| 7.6.6   | Perform generator failure emergency procedures.         | Given master caution light illuminated, annunciator generator light flashing, and loss of secondary bus; given generator failure emergency procedures checklist.   |
| 7.7     | Perform miscellaneous emergency procedures.             | Given flooding, man overboard, collision, plow-in, etc., and appropriate checklists.   |
| 7.7.1   | Perform craft flooding emergency procedures.            | Given craft attitude listing; given craft flooding emergency procedures checklist.   |
| 7.7.2   | Perform man overboard emergency procedures.             | Given visual sighting or alarm of man overboard; given man overboard emergency procedures checklist.   |
| 7.7.3   | Perform collision emergency procedures.                 | Given event of collision over land or over water; given U.S.C.G. Rules of the Road International-Inland document CG-169; given collision emergency procedures checklist.   |
| 7.7.4   | Deploy life rafts.                                      | Given casualty to craft and decision to prepare to abandon craft.  |
| 7.7.4.1 | Release life raft(s) from craft.                        | Given release button on life raft canister.  |

PHASE 7.0 - EMERGENCY AND ABNORMAL OPERATIONS

| NUMBER  | TASK                                       | CONDITIONS   |
|---------|--|--|
| 7.7.4.2 | Inflate raft(s).                           | If raft does not auto-inflate with painter line.   |
| 7.7.5   | Abandon craft (upright).                   | Given uncontrollable fire, collision, or flooding, given upright craft, and deployed and inflated rafts.                               |
| 7.7.5.1 | Proceed into life rafts.                   | Given deployed and fully inflated rafts, given distance and direction to nearest land, and plans for survival at sea.                  |
| 7.7.6   | Abandon craft (capsized).                  | Given high sea states and unusual craft attitudes, overturned craft.   |
| 7.7.6.1 | Remain in seats.                           | Until craft comes to rest.   |
| 7.7.6.2 | Escape from craft.                         | Via outboard windows.  |
| 7.7.6.3 | Proceed into life rafts.                   | Given deployed and fully inflated rafts, given distance and direction to nearest land, and plans for survival at sea.                  |
| 7.8     | Perform miscellaneous abnormal procedures. | Given loss of propulsion, equipment failure or miscellaneous non-emergency casualties.   |
| 7.8.1   | Perform towing operations.                 | Given loss of propulsion, given towing checklist and appropriate equipment and line-handlers.  |
| 7.8.1.1 | Perform towing operations over land.       | Given on-cushion mode of operations, intercom communications, towing checklist, and required equipment properly positioned and rigged. |
| 7.8.1.2 | Perform towing operations over water.      | Given intercom communications, towing checklist, and required equipment properly positioned and rigged.                                |

PHASE 7.0 - EMERGENCY AND ABNORMAL OPERATIONS

| NUMBER      | TASK                                      | CONDITIONS   |
|-------------|---|--|
| 7.8.1.2.1   | Operate craft on cushion, under tow.      | Given maximum towing speed of 10 knots, given towing checklist completed and clearance to start tow, given required towing equipment properly positioned and rigged.   |
| 7.8.1.2.2   | Operate craft in boating mode, under tow. | Given maximum towing speed of 5 knots, given towing checklist completed, given clearance to start tow, given required towing equipment properly positioned and rigged. |
| 7.8.1.3     | Enter well deck under tow.                | Given return to LSD, and loss of propulsion system; given carriage towing attachment fittings.   |
| 7.8.1.3.1   | Enter dry well (on cushion).              | Given towing checklist and appropriate equipment.  |
| 7.8.1.3.1.1 | Obtain clearance.                         | From support ship bridge.  |
| 7.8.1.3.1.2 | Ensure clear approach path.               | Given clearance from radar/navigation and visual observation.  |
| 7.8.1.3.1.3 | Hold position.                            | Given $N_2$ as required (dependent on load), in wake just astern of support ship.  |
| 7.8.1.3.1.4 | Supervise attachment of towline.          | With aid of support ship towing and boomline, and craft line handlers.   |
| 7.8.1.3.1.5 | Reduce prop pitch to zero.                | When support ship begins towing craft.   |
| 7.8.1.3.1.6 | Come off cushion.                         | When craft is in position inside well deck, by reducing $N_2$ .  |
| 7.8.1.3.1.7 | Secure craft to support ship.             | Given spring lines and aid of line handlers.   |
| 7.8.1.3.2   | Enter wet deck.                           | Given towing checklist and appropriate equipment, and wet well.  |
| 7.8.1.3.2.1 | Obtain clearance.                         | From support ship bridge.  |

PHASE 7.0 - EMERGENCY AND ABNORMAL OPERATIONS

| NUMBER      | TASK   | CONDITIONS  |
|-------------|--|---|
| 7.8.1.3.2.2 | Ensure clear approach path.                            | Given clearance from radar/navigation and visual observation.   |
| 7.8.1.3.2.3 | Hold position.   | Given $N_2$ as required (dependent on load), in wake just astern of support ship.   |
| 7.8.1.3.2.4 | Supervise attachment of towlines.                      | With aid of support ship towing and boomline, and craft line handlers.  |
| 7.8.1.3.2.5 | Reduce prop pitch to zero.                             | When support ship begins towing craft.  |
| 7.8.1.3.2.6 | Come off cushion.                                      | When craft is in position inside well deck, by reducing $N_2$ .   |
| 7.8.1.3.2.7 | Secure craft to support ship.                          | Given spring lines and aid of line handlers.  |
| 7.8.1.4     | Exit well deck (under tow).                            | Given towing checklist and appropriate towing equipment properly positioned and rigged.                                   |
| 7.8.1.4.1   | Exit dry well.   | Given support ship at anchor or on steady course at 1-3 knots, and dry well. (Refer to 2.4.2.1 for sub-tasks).            |
| 7.7.1.4.2   | Exit wet well.   | Given support ship at anchor or on steady course at 1-3 knots, and wet well. (Refer to 2.4.2.2 for sub-tasks).            |
| 7.8.2       | Perform APU protective shutdown procedures.            | Given automatic APU shutdown caused by high temperatures, excessive rpm or loss of oil pressure.                          |
| 7.8.3       | Perform main engine start sequence failure procedures. | Given failure of main engine start sequence and main engine start sequence failure procedures checklist.                  |
| 7.8.4       | Operate craft with clutches disengaged.                | Given conditions when it is not advisable to shut down engines; given disengaged clutches operating procedures checklist. |

PHASE 7.0 - EMERGENCY AND ABNORMAL PROCEDURES

| NUMBER | TASK  | CONDITIONS  |
|--------|---|---|
| 7.8.5  | Perform bow diaphragm removal procedures.   | Given bow diaphragm removal procedures checklist.   |
| 7.8.6  | Perform stern diaphragm removal procedures. | Given stern diaphragm removal procedures checklist. |

PHASE 8.0 - SECURE CRAFT

| NUMBER  | TASK  | CONDITIONS  |
|---------|---|---|
| 8.0     | Secure craft.                                     | Given mission completed and return to base.   |
| 8.1     | Perform craft securing checklist procedures.      | Given the aid of assistant operator and craft securing checklist.   |
| 8.1.1   | Perform equipment shutdown procedures.            | Given equipment shutdown checklist, N <sub>2</sub> levers at MIN PWR, N <sub>1</sub> levers at IDLE, wiper controls, light and instrument switches set as required, bow thruster switch FWD, bow thruster mode switch STOW. |
| 8.1.2   | Perform engine shutdown procedures.               | Given engine shutdown checklist, switches set as required.  |
| 8.1.2.1 | Monitor exhaust gas temperature (EGT) gages.      | For positive engine shutdown.   |
| 8.1.2.2 | Record engine(s) shutdown time.                   | Given mission summary forms.  |
| 8.1.3   | Perform APU shutdown procedures.                  | Given APU shutdown checklist.   |
| 8.1.3.1 | Monitor APU EGT gages.                            | For positive engine shutdown.   |
| 8.1.3.2 | Record APU shutdown time.                         | Given mission summary forms.  |
| 8.2     | Perform refueling checklist procedures.           | Given refueling checklist and fuel load requirements for next mission.  |
| 8.2.1   | Observe all standard fire and safety precautions. | Given standard fueling precautions.   |
| 8.3     | Perform mission log completion.                   | Given mission summary forms.  |